Collagen binding activity of bacteria isolated from pig and cow small intestine

Abstract

Bacterial adherence to connective tissue, especially to collagen has been vastly known for their invasive and infectious activities. However, the ability to exploit the unique and specific interactions between bacteria and collagen as a novel approach in detection of placental collagen has never been explored. This study aimed to determine bacteria with binding specificity to placental collagen (Type IV) derived from human and sheep. In order to do this, total bacteria from small intestines of pig and cow were isolated and their ability to bind to Type IV placental collagen (human and sheep) was determined. Interestingly, three bacterial samples; P5, P9 (pig small intestine origin) and B7 (cow small intestine origin) were found to be able to bind strongly to the placental collagen. The bacterial binding to human placental collagen was however, diminished after the bacteria were treated with trypsin, proteinase K (for removal of surface protein) and guanidine hydrochloride (for S-layer removal), suggesting that the interaction of these bacteria to placental collagen was promoted by protein(s) present at the bacterial surface. In addition, significant reduction of placental collagen-binding ability of the bacteria pre-incubated with soluble human placental collagen showed that there is a specific interaction between the bacteria and collagen. P5, P9 and B7 bacteria were found to share 95-97% 16S rRNA sequence similarity to Enterococcus faecalis ZL, Enterococcus hirae ss33b and Enterococcus faecium M3-1, respectively. The results presented here may facilitate future studies in identifying bacterial surface protein(s) responsible for the specific binding of bacteria to collagen and opens new opportunity to utilize the protein(s) for the detection of placental collagen in nutraceutical and food supplements.

Keyword: Bacterial binding; Placental collagen; Surface protein